Infectious Disease Epidemiology Section
Office of Public Health, Louisiana Dept of Health & Hospitals
800-256-2748 (24 hr number) – (504) 568-5005
www.oph.dhh.state.la.us

MENINGOCOCCAL INVASIVE DISEASE

Revised 01/25/2004

Epidemiology

Meningococcal Invasive Disease is a disease caused by the systemic invasion by the bacteria Neisseria meningitides, also known as meningococcus.

There are between 50 and 100 cases of meningococcal invasive diseases reported yearly in Louisiana. The incidence rate ranges from 1 to 2 /100,000 per year. This incidence is similar to U.S. incidence. The seasonal trend in the number of cases in Louisiana shows a high peak during the first quarter of the year (January to March), during which approximately 50% of the cases reported during the year occur. Infants (0-1 year old) have the highest occurrence of new cases of meningococcal meningitis, at 10 /100,000. However all age groups are at risk, particularly young adults and the elderly.

Most cases are sporadic. Outbreaks have been extremely rare in Louisiana. Outbreaks have occurred in semi-closed communities, including child care centers, colleges, and military recruit camps. However, in the public perception outbreaks are a major concern.

Meningococci are common colonizers of the upper respiratory tract (about 1 to 5% of healthy people are carriers at any time). Meningococci are transmitted, when a person coughs, sneezes, or speaks and sends droplets containing meningococci into the air, and other people inhale the bacteria. The bacteria enters the nose or throat and multiplies locally. If the immune system of the recipient is temporarily weakened, the bacteria may invade the blood, meninges or lung. The host factors that protect carriers from developing invasive disease are:
1-Specific functional antibodies,
2-Intact complement system,
3-Normal reticuloendothelial function.

The incubation period is 1 to 10 days, usually less than 4 days. The disease usually develops within a few days of initial colonization.

Clinical Description

The onset often is abrupt with fever, chills, malaise, prostration and a rash that initially may be macular, maculopapular, or petechial.

The signs and symptoms of meningococcal meningitis are indistinguishable from signs and symptoms of acute meningitis caused other meningeal bacterial pathogens. Common symptoms of meningitis include headache, nausea and often vomiting, stiff neck and photophobia.

Less common manifestations include pneumonia, febrile bacteremia, conjunctivitis. Complications are arthritis, myocarditis, pericarditis, and endophthalmitis.

The fulminant cases (Waterhouse-Friderichsen syndrome) are characterized by purpura, disseminated intravascular coagulation, shock, coma. Death may follow within several hours despite appropriate therapy. The case fatality rate varies widely, from 5 to 25% from year to year. Meningococcal disease also causes

substantial morbidity: about 10% of survivors have sequelae (e.g., neurologic disability, limb loss, and hearing loss.

Surveillance

Meningococcal invasive disease is a reportable condition. Do not report colonization: meningococci identified in the upper respiratory tract or sputum.

The CDC national bacterial meningitis and bacteremia report form does not need to be completed. This report was part of a CDC study conducted many years ago, and these forms are no longer being collected. The information within the supplemental form on the RDD is transmitted to CDC electronically; no additional report is required.

Case Definition

Clinical description: Meningococcal disease manifests most commonly as meningitis and/or meningococcemia that may progress rapidly to purpura fulminans, shock, and death. However, other manifestations might be observed.

Laboratory criteria for diagnosis
Isolation of Neisseria meningitidis from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, less commonly, joint, pleural, or pericardial fluid)

Case classification
Probable: a case with a positive antigen test in CSF or Gram negative diplococci or clinical purpura fulminans in the absence of a positive blood culture
Confirmed: a clinically compatible case that is laboratory confirmed

Positive antigen test results from urine or serum samples are unreliable for diagnosing meningococcal disease.

Laboratory Tests

Examination of the spinal fluid collected from a spinal tap is useful for the etiologic diagnosis of a meningitis.

CSF	**Normal**	**Bacterial Meningitis**	**Aseptic Meningitis**
Opening Pressure	70-180 mm H_2O	Normal to increased	Usually normal
Protein	15-45 mg/dL	Increased	Normal to increased
Glucose	45-80 mg/dL	Decreased	Normal to decreased
WBC Count	0-10	25 to 10 x 10^3	5 to 2 x 10^3
Predominant Cells	Mononuclear	Polymorphonuclear	Lymphocytes
Gram stain	Negative	May be positive	Negative

Source: AMA

A Gram stain of a CSF specimen, petechial or purpuric scraping, and buffy coat smear of blood may show a Gram negative diplococcus.

Cultures of blood and cerebrospinal fluid (CSF) are indicated for patients with suspected invasive meningococcal disease. Other sites that could be cultured are: a petechial or purpuric scraping, synovial fluid, and other body fluid specimens. Because meningococci can be part of the nasopharyngeal flora, isolation of meningococci from the upper respiratory tract site is not diagnostic.

Bacterial antigen detection in CSF supports the diagnosis of a probable case if the clinical illness is consistent with meningococcal disease. Antigen detection offers rapidity in diagnosis and specificity, provided that organisms containing cross-reacting antigens are not involved (e.g., *E. coli* K1 and group B streptococci). False-negative results occur commonly: in one series almost half of the patients with meningococcal meningitis had negative tests. Positive antigen results from serum and urine samples are unreliable for diagnosing meningococcal disease.

A serogroup-specific polymerase chain reaction test to detect N meningitidis from clinical specimens is under development in the USA.

Serologic diagnosis is not used for the diagnosis of invasive meningococcal disease.

After cultures are done by the initial health care facility and isolation of N. meningitides is made, forward the isolate to the State Lab for serogrouping (without cost), even if the referring laboratory has already determined the serogroup. This will ensure that the isolates will be available in the event further subtyping becomes necessary during an outbreak investigation. If necessary, consult with the State Lab Bacteriology Section for transport and handling. The organism produces a polysaccharide capsule which protects the meningococci from human host defenses and is used for differentiation in serogroups. Serogroups A, B, C, Y, and W-135 are responsible for invasive disease. Serogroups B, C, and Y each account for approximately 30% of reported cases in Louisiana.

Pulsed Field Gel Electrophoresis (PFGE) techniques are performed to be more specific for the same serogroup strain. If necessary, consult with the State Lab Bacteriology Section for transport and handling and the Infectious Disease Epidemiology Section for further consultation.

Case Investigation

The purpose of investigation is to confirm cases, to differentiate between the serogroups of meningococci, and to prevent transmission by identifying those most at risk and recommending appropriate prophylaxis.

Contact the physician or hospital to confirm the diagnosis by obtaining a clinical summary, results of CSF examination (cell count, % of types of leucocytes, glucose and protein), CSF Gram stain, blood and CSF culture, CSF antigen detection. Request the physician or hospital to send the culture on the suspected case to the state laboratory for serogrouping.

A case investigation would not be warranted on the basis of a simple suspicion of meningitis or of bacterial meningitis of unknown origin. However, a case investigation should be instituted for cases meeting the probable definition and should not be delayed pending final confirmation.

Identify all close contacts of the case. Close contacts are defined as

- household members,
- child care center classmates, nursery school contacts
- personnel who resuscitated, intubated, or suctioned the patient before antibiotics were begun
- persons who had intimate contact with the patient's oral secretions: Those who have been exposed to oral secretions of a case, such as occurs as a result of kissing or sharing of food and drink (same plate or same cup), using same toothbrush.

Do not include casual contacts: There is no evidence that casual contact places a person at any increased risk of developing the disease. These casual contacts include:

- classroom (other than child care center),
- elementary or secondary school class mates
- school bus,

- office co-worker,
- health care worker with casual contact (for example, entering the patient room, taking vital signs).

All close contacts should receive antibiotic prophylaxis. Chemoprophylaxis can eliminate nasopharyngeal carriage of close contacts and therefore reduce their risk of developing invasive disease BUT chemoprophylaxis does NOT prevent contacts from subsequently acquiring the infection and chemoprophylaxis does NOT treat infection in those incubating disease.

Educate contacts on disease transmission and encourage them to take all dosages of the antibiotic. Explain that since the prophylactic antibiotic does not cure incubating disease, anyone developing signs and symptoms (fever) should see their physician.

The index case also should receive chemoprophylaxis before hospital discharge unless the infection was treated with ceftriaxone or cefotaxime, both of which are effective in nasopharyngeal eradication of N. meningitidis.

Close observation of contacts is recommended, and they should be evaluated promptly if a febrile illness develops. Exposed individuals who develop a febrile illness should seek prompt medical evaluation even if they received an adequate prophylaxis. Prophylaxis does NOT cure incubating disease.

Day Care Center:
If a case of Meningococcal meningitis is associated with a child care center, notify the Infectious Disease Epidemiology Section and follow these recommendations:
1-Contact the owner/director of the child care or private baby-sitter to notify her of the case and to determine if any other cases have occurred.
2- Prepare a list of all children and adults attending the center.
3-Arrangements will need to be made to insure that all children and employees receive appropriate chemoprophylaxis and clinical surveillance. Have the child care owner/director send a letter home to the parents notifying them of the situation and indicating the need for prophylactic treatment with rifampin. (See attached sample letter).
4-Make arrangements to provide chemoprophylaxis (usually rifampin in this case) to child care contacts. Prophylaxis must be given as soon as possible, therefore it is of vital importance to coordinate and collaborate the necessary information as soon as notification of an exposure has occurred. Provision of Rifampin with dosage instructions will insure appropriate prophylaxis of all contacts.

Schools: When a case of meningococcal disease occurs in a school (other than a child care center), it is not necessary for school officials to send notices home to the parents of asymptomatic children to suggest that they seek prophylaxis. Such actions are unwarranted and are often responsible for creating ommunity confusion and panic. In the event that rumors have been spreading among school children, their parents and the media, school officials might feel that it is necessary to inform the community. In this case the points important to make are:
1-There is case in the school however there is no outbreak and outbreaks are an exception nowadays,
2-The classmates and other school children are NOT at higher risk of acquiring the disease than anyone else in the community,
3-If any one should experience flu like signs and symptoms, they should be evaluated by a physician. More than likely these would be the results of an infection by some other microorganism.
4-Provide OPH phone number

Chemoprophylaxis

Rifampin, ceftriaxone, and ciprofloxacin are appropriate drugs for chemoprophylaxis in adults.

Ciprofloxacin administered to adults in a single oral dose also is effective in eradicating meningococcal carriage. A single 500-mg oral dose of ciprofloxacin is a reasonable alternative to the multidose rifampin regimen. It is often preferred because of its single dose administration. At present, ciprofloxacin is not recommended for people younger than 18 years of age or for pregnant women and lactating women. A recent international consensus report has concluded that ciprofloxacin can be used for chemoprophylaxis of children when no acceptable alternative therapy is available.

Ceftriaxone given in a single intramuscular dose was administered (125 mg for children and 250 mg for adults) is as effective as oral rifampin. Ceftriaxone has the advantage of ease of administration, which increases compliance, and is safe for use during pregnancy. Rifampin is not recommended for pregnant women.

Rifampin is administered twice daily for 2 days (600 mg every 12 hours for adults, 10 mg/kg of body weight every 12 hours for children >1 month of age, and 5 mg/kg every 12 hours for infants <1 month of age). Where mass prophylaxis has been used, rifampin resistant strains have quickly developed. Between 10 to 25% of contacts treated with rifampin will eventually become recolonized with rifampin resistant strains. Repeated and unjustified use of rifampin among medical personnel would result in increasing in-hospital circulation of rifampin resistant meningococci. Rifampin is the drug of choice for most children. It is not recommended during pregnancy, however in tuberculosis patients who were pregnant and had received rifampin, no teratogenic effects were noted. Rifampin changes the color of urine to reddish-orange and is excreted in tears and other body fluids; it may cause permanent discoloration of soft contact lenses. Because the reliability of oral contraceptives may be affected by rifampin therapy, consideration should be given to using alternate contraceptive measures while rifampin is being administered.

Some experts recommend a 2-day course of azithromycin dihydrate, which has been shown to be effective for eradication.

Drug	Age group	Dosage	Duration
Rifampin	Children <1mo	5mg/kg q12hr	2 days
	Children ≥1 mo	10mg/kg q12hr	2 days
	Adults	600mg q12hrs	2 days
Cipro	Adults	500mg	Stat
Ceftriaxone	Children <15 yr	125mg	Stat IM
	Adults	250mg	Stat IM

The health department does not provide chemoprophylaxis to individuals and/or families. They should be referred to their private physician or charity hospital. In some instances, OPH may arrange to provide prophylaxis (Contact the Regional Medical Director).

Infected people are not considered contagious after 24 hours of appropriate antimicrobial therapy. After discharge from the hospital, they pose no risk to classmates and may return to school.

Chemoprophylaxis administered >14 days after onset of illness in the index case-patient is probably of limited or no value. Oropharyngeal or nasopharyngeal cultures are not helpful in determining the need for chemoprophylaxis and may unnecessarily delay institution of this preventive measure.

Contact during flight

The assessment of risk to passengers and flight crew members should be based on the flight duration and seating proximity to the index case-patient. For flights of >8 hours, including ground time, passengers who are seated immediately next to an index case are more likely to be exposed directly to the patient's oral secretions and are probably at higher risk than those seated farther from the index case-patient. In the

absence of data about increased risk to other passengers, antimicrobial chemoprophylaxis should be considered for those passengers seated in either seat next to an index case-patient.

If notified by CDC of flight contacts, OPH is responsible for contacting each exposed traveler. If the exposed passenger is a foreign national temporarily visiting the United States, the CDC quarantine station can assist in locating and contacting the person.

Most cases of meningococcal disease among air passengers are not detected until after the flight has landed and the passengers have dispersed. Health care providers should ask all persons with meningococcal disease about recent travel, including flight information.

Federal law requires that an ill passenger on an international conveyance must be reported to the Public Health Service before arrival in the United States. The pilot should contact the closest of eight CDC quarantine stations that are located at international airports to report an ill passenger. Quarantine station staff will assist the airline in management of the ill passenger and notification of fellow passengers and crew members. Many pilots are not familiar with the requirement to report arriving ill passengers aboard flights.

Notification of meningococcal exposures on an aircraft is frequently hindered by difficulty in obtaining passenger contact information. Airlines typically maintain the passenger manifest and history records for 2-7 days, after which they are either archived or destroyed.

Outbreak Management

The following only applies when there is an outbreak, NOT for a single case

Outbreaks are characterized by increased rates of disease among persons who may have a common organizational affiliation or who live in the same community yet do not have close contact.

An outbreak is defined by the occurrence of 3 or more confirmed or probable cases of identical serogroup meningococcal disease during a period of ≤ 3 months, with a resulting primary attack rate of at least 10 cases per 100,000 population. For calculation of this threshold, population-based rates are used and not age-specific attack rates. Outbreaks are extremely rare in Louisiana.

A primary case is a case that occurs in the absence of previous known close contact with another case-patient. A secondary case is defined as one that occurs among close contacts of a primary case-patient >24 hours after onset of illness in the primary case-patient. If two or more cases occur among a group of close contacts with onset of illnesses separated by <24 hours, these cases are considered to be co-primary.

An organization-based outbreak is defined as the occurrence of three or more confirmed or probable cases during a period of ≥ 3 months in persons who have a common affiliation but no close contact with each other, resulting in a primary disease attack rate of at least 10 cases per 100,000 persons. In instances where close contact has occurred, chemoprophylaxis should be administered to close contacts. Organization-based outbreaks have recently occurred in schools, universities, and correctional facilities. Investigation of organization-based outbreaks may reveal even closer links between patients than suggested by initial reports.

A community-based outbreak is defined as the occurrence of three or more confirmed or probable cases during a period of ≤ 3 months among persons residing in the same area who are not close contacts of each other and who do not share a common affiliation, with a primary attack rate of at least 10 cases per 100,000 population. Community-based outbreaks have occurred in towns, cities, and counties . Distin-

guishing whether an outbreak is organization-based or community-based is complicated by the fact that, in some instances, these types of outbreaks may occur simultaneously.

The population at risk is defined as a group of persons who, in addition to close contacts, are considered to be at increased risk for meningococcal infection when compared with historical patterns of disease in the same population or with the risk for disease in the general U.S. population. This group is usually defined on the basis of organizational affiliation or community of residence. The population at risk is used as the denominator in calculations of the disease attack rate.

During a vaccination campaign, the group designated to be administered vaccine is called the vaccination group. In some instances, the vaccination group will be the same as the population at risk; however, in other instances, these groups may differ. For example, in an organization-based outbreak at a university in which all cases have occurred among undergraduates rather than graduate students, faculty, or other staff, undergraduates may be the vaccination group. In community-based outbreaks, cases often occur in persons within a narrow age range (e.g., only in persons <30 years of age). Because the available vaccine is probably not effective in children <2 years of age, these children are not usually included in the vaccination group, and the vaccination group may be that portion of the population at risk who are 2–29 years of age. For control of outbreaks, vaccination administered before or during the seasonal peak (i.e., fall and winter months) is more likely to prevent cases than vaccination administered during lower incidence periods (i.e., spring and summer).

Meningococcal vaccine is recommended for the control of outbreaks, which often affects older children and adults, for whom vaccination is effective. The benefit of vaccination for control of outbreaks is difficult to assess because the pattern of disease occurrence is unpredictable and the numbers of cases are usually small.

Outbreaks have occurred in organizations and communities.
In a community-based outbreak, identifying groups most likely to benefit from vaccination is more difficult because communities include a broad range of ages among whom risk for disease and vaccine efficacy vary. Thus, the recommendations for evaluation and management of organization-based and community-based outbreaks are considered separately.

Ten steps to control an outbreak

1-Establish a diagnosis of meningococcal invasive disease
Only confirmed and probable cases should be considered in the characterization of a suspected outbreak. Cases not fulfilling these criteria should be excluded from consideration.

2-Administer chemoprophylaxis to appropriate contacts.
Chemoprophylaxis should be administered to close contacts of patients. Administering chemoprophylaxis to persons who are not close contacts of patients has not been effective in preventing community outbreak-associated cases and usually is not recommended. Neither oropharyngeal nor nasopharyngeal cultures for N. meningitidis are useful in deciding who should receive chemoprophylaxis or when investigating suspected outbreaks.

3-Enhance surveillance, save isolates, and review historical data.
OPH relies on passive surveillance for meningococcal disease, which may result in delayed or incomplete reporting of cases. When an outbreak is suspected, potential reporting sites (hospitals) should be alerted and encouraged to report new cases promptly. Reporting sites also should send all N. meningitidis isolates to the state laboratory until investigation of the suspected outbreak is completed. This action will ensure availability of isolates for confirmation of serogroup and application of other methods for subtyping. Information on the serogroup of N. meningitidis isolates is needed to fulfill criteria for confirmed and

probable case definitions. This information should be obtained promptly with all meningococcal disease case reports.

Overall and serogroup-specific meningococcal disease rates for previous years in the same or comparable population(s) should be reviewed. These data should be compared with data currently reported for the population being evaluated to characterize both the geographic extent and magnitude of the outbreak.

4-Investigate links between cases.
In addition to demographic information, collect age-appropriate information concerning each patient (e.g., close contact with other case-patients, day care attendance, participation in social activities, participation in sports activities, and affiliation with organizations). This information will help identify secondary and co-primary cases and also may reveal links between cases that will help define the population at risk.

5-Subtyping.
Subtyping of N. meningitidis isolates is done in Louisiana by using pulsed-field gel electrophoresis of enzyme-restricted DNA fragments. PFGE may provide information that will be useful in determining whether a group of cases represents an outbreak. Outbreaks usually are caused by closely related strains. Subtyping data can allow identification of an "outbreak strain" and aid in better defining the extent of an outbreak.

If strains from a group of patients are unrelated by subtyping, the group of cases most likely does not represent an outbreak. Although subtyping is potentially useful, it is time consuming and can be done only in specialized reference laboratories. In addition, results can sometimes be difficult to interpret. Initiation of outbreak-control efforts should not be delayed until subtyping results are available.

Exclude secondary and co-primary cases. To calculate a primary disease attack rate, all confirmed and probable cases should be summed; secondary cases should be excluded and each set of co-primary cases counted as one case. Because the purpose of calculating attack rates is both to characterize the risk for disease among the general population and to determine whether overall rates have increased, related cases (i.e., secondary and co-primary cases) should not be included. Epidemiologically, secondary and co-primary cases can be considered as representing single episodes of disease with direct spread to one or more close contact(s), which is consistent with endemic disease. Because the risk for acquiring meningococcal disease is 500–800 times greater among close contacts of case-patients than among the total population, chemoprophylaxis is recommended for these persons. Because secondary and co-primary cases occur infrequently, they should represent a small portion of outbreak-associated cases in the United States.

6-Determine if the suspected outbreak is organization- or community-based.
Epidemiologic and laboratory investigations can reveal common affiliations among case-patients. Potential affiliations can be organizational, with all or most of the patients attending a particular day care center, school, or university; belonging to a sports team or club. Alternatively, common affiliations can be geographic (e.g., residing in the same town, city, or county). Of 21 U.S. outbreaks identified between 1980 and mid-1993, 11 (52%) were organization-based and 10 (48%) were community-based. Eight (73%) of the 11 organization-based outbreaks occurred in schools. If a common organizational affiliation other than community can be identified, the outbreak is termed organization-based; otherwise, it is considered to be community-based.

7-Define population at risk and determine its size.
In organization-based outbreaks, cases are linked by a common affiliation other than a shared geographically delineated community. The population at risk is the group of persons who best represent that affiliation. For example, if the only association between patients was attending the same school or university, the population at risk would be all persons attending the school or university. Information concerning the

size of the organization should be obtained from officials in the organization. In community-based outbreaks, there are no common affiliations among patients other than a shared, geographically defined community. The population at risk can be defined by the smallest geographically contiguous population that includes all (or almost all) case-patients. This population is usually a neighborhood, town, city, or county. The size of the population can be obtained from census information.

8-Calculate the attack rate.

If three or more cases have occurred in either an organization- or community-based outbreak in ≤ 3 months (starting at the time of the first confirmed or probable case), a primary disease attack rate should be calculated. Because of the small number of cases typically involved and the seasonal patterns of meningococcal disease, rate calculations should not be annualized for use in this algorithm. The following formula can be used to calculate this attack rate:

$$\text{Attack rate per } 100{,}000 = \frac{(\text{Number of definite and probable cases during a 3-month period})}{(\text{Number of population at risk})] * 100{,}000}$$

The actual attack rate at which the decision to vaccinate is made may vary. Public health personnel should consider the following factors: a) completeness of surveillance and number of possible cases for which bacteriologic confirmation or serogroup data are not available; b) occurrence of additional cases after recognition of a suspected outbreak (e.g., if the outbreak occurred 2 months previously and if no additional cases have occurred, vaccination may be unlikely to prevent additional cases); and c) logistic and financial considerations.

If an attack rate exceeds 10 cases per 100,000 persons, vaccination of the population at risk should be considered.

9-Select the target group for vaccination.

In most organization-based outbreaks, the vaccination group may include the whole population at risk provided all persons are >2 years of age. If a substantial proportion of patients are <2 years of age and, thus, not eligible to receive the current vaccine, patients <2 years of age may be excluded and, if at least three case-patients remain, an attack rate should be recalculated. If after recalculation the attack rate is still more than 10 cases per 100,000 persons, vaccination should be considered for some or all of the population at risk >2 years of age. In some organization-based outbreaks, a vaccination group larger than the population at risk may be designated. For example, in a high school in which all outbreak-associated cases occurred among students, authorities may decide to offer vaccine to staff. In communitybased outbreaks, the vaccination group usually can be defined as a subset of the entire population at risk, based on a group >2 years of age (e.g., 2–19 or 2–29 years of age). This age range should contain all (or almost all) patients >2 years of age. If a large proportion of patients are <2 years of age and probably will not be protected with the current vaccine, patients <2 years of age may be excluded from calculation of an attack rate.

10-Select the target group for immunization

In some situations, the entire population >2 years of age, without other age restriction, might be the most appropriate vaccination group. For example, in a small town in which several cases have occurred among children >2 years and adults >29 years of age, it may be most appropriate to select all persons >2 years of age as the vaccination group. For larger populations, this decision would be costly in terms of finances and human resources and restricting the vaccination group to the persons in age groups with the highest attack rates may be more appropriate. Age-specific attack rates can be calculated by using the formula previously provided and restricting the numerator and denominator to persons within specific age groups (e.g., persons 2–19 years of age). Many recent immunization programs have been directed at persons who are 2–19 years of age or who are 2–29 years of age.

Other Control Measures

Mass chemoprophylaxis (i.e., administration of antibiotics to large populations) **is not effective** in most settings in which community-based or organization-based outbreaks have occurred. Disadvantages of widespread administration of antimicrobial drugs for chemoprophylaxis include cost of the drug and administration, difficulty of ensuring simultaneous administration of chemoprophylactic antimicrobial drugs to large populations, side effects of the drugs, and emergence of resistant organisms. In most outbreak settings, these disadvantages outweigh the possible (and unproven) benefit in disease prevention. However, in outbreaks involving small populations (e.g., an outbreak in a small organization, such as a single school), administration of chemoprophylaxis to all persons within this population may be considered. If mass chemoprophylaxis is undertaken, it should be administered to all members at the same time.

In the United States, measures that have not been recommended for control of outbreaks include restricting travel to areas with a outbreak, closing schools or universities, or cancelling sporting or social events. Educating communities, physicians, and other health-care workers about meningococcal disease is an important part of managing suspected outbreaks.

Educational efforts should be initiated as soon as an outbreak is suspected.

Immunization

Meningococcal Vaccine: A serogroup-specific quadrivalent meningococcal vaccine against serogroups A, C, Y, and W-135 N. meningitidis is available in the United States for use in children 2 years of age and older. The vaccine is administered subcutaneously as a single 0.5-mL dose and can be given concurrently with other vaccines but at a different site. No vaccine currently is available in the United States for the prevention of group B disease.

Serogroup A meningococcal polysaccharide vaccine is immunogenic in children 3 months of age and older. When the quadrivalent A, C, Y, and W-135 vaccine is given to infants less than 2 years of age, response to meningococcal polysaccharides other than A is usually is poor. Serogroup C, Y and W135 polysaccharide are immunogenic and safe for children 2 years of age and older.

Indications. Routine childhood immunization with meningococcal polysaccharide vaccine is not recommended, because the infection rate in the general population is low, response is poor in young children, immunity is relatively short-lived, and the response to subsequent vaccine doses is impaired for some serogroups.

Immunization is recommended for children 2 years of age and older in high-risk groups:

- People with functional or anatomic asplenia
- People with terminal complement component or properdin deficiencies
- College students who will be living in dormitories for the first time are at increased risk of invasive meningococcal disease. College students and their parents should be educated about the risk of vaccine-preventable meningococcal disease for students living in dormitories for the first time and the existence of a safe and effective vaccine.
- Immunization may be beneficial for travelers to countries recognized to have hyperendemic or epidemic meningococcal disease caused by a vaccine-preventable serogroup.
- Military recruits in the United States.
- Scientists who are exposed routinely to N meningitidis in solution should consider immunization. Data suggest that N. meningitidis isolates pose a potential risk for microbiologists, and these isolates should be handled in a manner that minimizes risk of exposure to aerosols or droplets.

Immunization for college students

The risk for meningococcal disease among college students is low; therefore, vaccination of all college students, all freshmen, or only freshmen who live in dormitories or residence halls is not likely to be cost-effective for society as a whole. Thus, the Advisory Committee on Immunization Practices (ACIP) is issuing the following recommendations regarding the use of meningococcal polysaccharide vaccines for college students.

College freshmen who live in dormitories are at modestly increased risk for meningococcal disease relative to other persons their age. Vaccination with the currently available quadrivalent meningococcal polysaccharide vaccine will decrease the risk for meningococcal disease among such persons. College freshmen who want to reduce their risk for meningococcal disease should either be administered vaccine (by a doctor's office or student health service) or directed to a site where vaccine is available.

The risk for meningococcal disease among non-freshmen college students is similar to that for the general population. However, the vaccine is safe and efficacious and therefore can be provided to non-freshmen undergraduates who want to reduce their risk for meningococcal disease.

At present, there are no data suggesting that children and adolescents living in non-college dormitory settings are at increased risk of invasive meningococcal disease.

Some institutions require immunization from all students. Soma states have laws mandating immunization of all college students (www.immunize.org/laws).

Vaccination does not eliminate risk because 1) the vaccine confers no protection against serogroup B disease and 2) although the vaccine is highly effective against serogroups C, Y, W-135, and A, efficacy is <100%.

Although the need for revaccination of older children has not been determined, antibody levels decline rapidly over 2--3 years. Revaccination may be considered for freshmen who were vaccinated more than 3--5 years earlier. Routine revaccination of college students who were vaccinated as freshmen is not indicated.

Reimmunization.

Little information is available to determine the need for or timing of reimmunization when the risk of disease continues or recurs. In children, especially children initially immunized when younger than 5 years of age, antibody concentrations decrease markedly during the first 3 years after immunization. Reimmunization may be indicated for people at high risk of infection (eg, people residing in areas in which disease is epidemic), particularly for children who were first immunized when they were younger than 4 years of age; such children should be considered for reimmunization after 2 to 3 years if they remain at high risk. Although the need for reimmunization of older children and adults has not been determined, antibody concentrations rapidly decrease over 2 to 3 years, and if indications still exist for immunization, reimmunization may be considered 3 to 5 years after receipt of the initial dose.

Adverse reactions and precautions:

Rare and mild adverse reactions occur, the most common of which is localized pain and erythema for 1 to 2 days. Studies suggest that meningococcal immunization recommendations should not be altered because of pregnancy.

FOR DAY CARE CENTERS, NOT FOR ELEMENTARY OR SECONDARY SCHOOLS

Dear Parent,

Meningococcal meningitis is a bacterial infection that leads to the inflammation of the spinal cord and/or brain. The Louisiana Office of Public Health is aware of one probable case of meningococcal meningitis diagnosed in a child at the _____Day Care Center.

In accordance with the guidelines established by the Centers for Disease Control and Prevention and the American Academy of Pediatrics, the Louisiana Office of Public Health recommends that all children attending _____ Day Care Center receive antibiotic prophylaxis in order to reduce the risk of developing disease.

While antibiotic prophylaxis has been demonstrated to substantially decrease the risk of contracting meningococcal disease, it remains important for parents and guardians to observe their children for signs of illness. If your child complains of or develops any of the following symptoms, please seek medical advice:

- Fever
- Sore throat
- Nausea and vomiting
- Loss of appetite
- Lethargy (sluggishness, confusion, fatigue)
- Headaches
- Stiff neck
- Flat red rash on the trunk of body or extremities
- Intolerance to light and/or sound

The attached information sheet may address some of your questions and concerns. You may also contact the Office of Public Health at 1-800-256-2748 or the regional public health office at (___) ___-____, for any additional questions you might have. Please sign the form below and return it to the _____ Day Care director.

……

I have received the meningococcal disease notification and prophylaxis recommendations provided by the _____ Day Care Center and the Louisiana Office of Public Health.

Date

Parent's Signature